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SUMMARIES OF ARTICLES.

[ABBREVIATIONS.—*Am. J. Ps.* = *The American Journal of Psychology*; *Ar. de Ps.* = *Archives de Psychologie*; *Ar. f. G. Ph.* = *Archiv für Geschichte der Philosophie*; *Ar. f. sys. Ph.* = *Archiv für systematische Philosophie*; *Br. J. Ps.* = *The British Journal of Psychology*; *Int. J. E.* = *International Journal of Ethics*; *J. of Ph., Psy., and Sci. Meth.* = *The Journal of Philosophy, Psychology, and Scientific Methods*; *J. de Psych.* = *Journal de Psychologie*; *Psych. Bul.* = *Psychological Bulletin*; *Psych. Rev.* = *Psychological Review*; *Rev. de Mét.* = *Revue de Métaphysique et de Morale*; *Rev. Néo-Sc.* = *Revue Néo-Scolastique*; *Rev. Ph.* = *Revue Philosophique*; *Rev. de Ph.* = *Revue de Philosophie*; *R. d. Fil.* = *Rivista di Filosofia*; *V. f. w. Ph.* = *Vierteljahrsschrift für wissenschaftliche Philosophie*; *Z. f. Ph. u. ph. Kr.* = *Zeitschrift für Philosophie und philosophische Kritik*; *Z. f. Psych.* = *Zeitschrift für Psychologie und Physiologie der Sinnesorgane, I. Abtl. Zeitschrift für Psychologie.* — Other titles are self-explanatory.]

La Théorie de la Relativité et sa Signification. E. GUILLAUME. *Rev. de Mét.*, XXVII, 4, pp. 423-469.

Every physical description, according to Einstein, resolves itself into a certain number of propositions expressing the concordance of four quantities, X_1, X_2, X_3, X_4 , having no empirical significance. It is at that price that we can—one dares no longer say 'know'—hope to have some grasp of physical phenomena. The equations representing the phenomena include no longer any empirical constant (such as time) but simply mathematical ones. To know the world reduces to knowing the calculus of variations and the theory of invariants. We cannot be too astonished, therefore, if the results do not give us complete satisfaction; possessing a remarkable theory of gravitation, we experience only an alloyed pleasure; it represents nothing to our eyes; it doesn't 'talk' to us; it procures for us only a rarefied intellectual satisfaction. In classical physics time is introduced analytically as a unique parameter, T , which plays the part of an independent variable—a *monoparametrical* representation. One may say that this parameter is the mother-clock, independent of physical phenomena, which establishes the psychological liaison between nature and our brain. In the Theory of Relativity, on the other hand, is introduced a temporal parameter, t , peculiar to each system of reference, S , and since the number of possible systems is infinite, time is expressed by as many variables. The fact that this is a purely Einsteinian convention must not be overlooked. The confusion—for it can be shown to be one—in Einstein's Theory consists in confounding a formula related to an exactly determined duration with one referring to a relation between periods of duration. One can speak either of *monoparametrical*

or *polyparametrical* representations of time. In general they form two equivalent conventions and lead to the same interpretations of physical formulae. It is for us to choose the most convenient; instead of speaking of the 'relativity of time' we would do better to speak of the 'relativity of clocks.' What then, is the significance of the Special Theory of Relativity? It has not been useless, for it has forced us to formulate our ideas relating to the physical universe more precisely. We finally arrive at a conclusion derived from a study of the mathematics of the theory having the following paradoxical form: The Special Theory of Relativity and its expression by means of *homogeneous derivatives* (space-time) leads to *non-Euclidean movements of Euclidean systems* ($S_1, S_2, \dots S_n$). But a discontinuity is bound to appear in the process; and the question arises whether an Euclidean space can coëxist with a non-Euclidean one. For Physicists this problem becomes that of finding out why radial energy, which propagates itself according to the continuous laws of the Relativity Theory, nevertheless presents itself to us under the form of discontinuous parcels called 'quanta' of energy. According to Relativity we can announce a new principle of *physical equivalence of energy and matter*. The Special Theory here leaves a serious gap. Admitting that radiant energy follows laws quite other than those of matter, so that light attains instantaneously its greatest velocity, it also teaches that the mass of a moving body increases with its velocity and would become infinite if the body could attain the velocity of light; that is to say, the velocity of light constitutes a limit inaccessible to matter. To close this gap Einstein developed a General Theory based on the Special Theory but assuming in addition that an electromagnetic field or a field of light rays partakes of the nature of matter—is material—and therefore subject to gravitation. But the substitutions necessary in transferring from the equations of the Special Theory to those of the General, or Gravitational-field Theory are not in general exact differentials. In other words the type of space of the one theory is not 'applicable' to that of the latter conception; the two spaces do not have the same 'curvature'—are not 'isometrical.' How solve this difficulty? Let us assume that the variables (x, y, z) are not the curvilinear coördinates of a fictive fourth dimension, but the familiar rectangular ones of three dimensional space. We can now divide the Einsteinian equations by the time differentials (dt, dt^2)— T being the classical independent variable—and the equations in question now refer to velocities, instead of representing linear elements of the fourth dimension. Further, in every gravitational field the elementary wave produced by a light signal is no longer a sphere but a '*quadric*.' The substitutions thus have a sense completely determined, and when Einstein affirms that the Special Theory is valid only in the region of the infinitely small, he simply means, according to our conception, that the equation of a 'quadric' can be given

in the form of a sum of squares. For a Lilliputian observer the light wave would appear spherical. Complete knowledge of the light 'quadric' would determine the temporal and spatial scales (units of measure) of the rectangular (x, y, z) system. In the case of the solar field, the 'quadric' is an ellipsoid of revolution in each point of space; the axis of revolution is the perpendicular joining the point considered to the attractive center; these ellipsoids differ very little from spheres. This interpretation of the General Theory is as simple as satisfactory. Contrary to the statements of the present German school, it in no wise obliges us to abandon our Euclidean geometry, which is the simplest instrument for analyzing space into its elements.

H. R. SMART.

Pragmatism as Interactionism. ARTHUR O. LOVEJOY. J. of Ph., Psy., and Sci. Meth., XVII, 22, pp. 589-596; 23, pp. 622-632.

Pragmatism has shifted its emphasis from what thinking is to what thinking does, from epistemological problems to a theory of intelligence as the control of the future, which shifts its significance from logic to metaphysics. It should, and does, quarrel with mechanism and all forms of parallelism and epiphenomenalism, in consequence of which one would expect a thorough-going discussion of interaction and other doctrines of psychophysical relations, with an explanation of the relation of intelligence to, and its function in, the material world. The nearest approach to such a discussion is Professor Bode's essay in *Creative Intelligence*, in which he contends, quite properly, that according to the parallelistic scheme, foresight, the sense of obligation, and even truth and error become mere neural indicators. In the same essay, however, Professor Bode objects also to interactionism as merely putting mental links in the mechanistic chain. Possible pragmatic grounds for this objection are the demand for innovation and the aversion to any kind of psychophysical dualism. Confining the discussion to the latter, one must ask if the pragmatists can consistently have, what they insistently demand, an anti-mechanistic materialism, an efficacious intelligence, irreducible to mechanical laws yet non-psychical, a unique, conscious behavior of objects, without a psychophysical dualism? Is not the pragmatic dualism of causal processes more catastrophic in its implication than the dualism of existence implied by 'representation,' which at least has no power to upset the natural world? The answer may come with a further examination of intelligence. In his essay, Professor Bode gives three distinguishing peculiarities of 'conscious' responses which he defines as (1) progressive organization of (2) a selective character in which (3) future results act as present stimuli—a good description of intelligence, if one could omit Professor Bode's further modification which makes it possible for the future reference to be an *unconscious* one, thereby leaving intel-

ligence undifferentiated from certain automatic activity. In any case the pragmatic future and past as present-as-absent undermine the pragmatic platform of non-psychophysical dualism, for past and future are certainly not physically present. Pragmatists have only been able to avoid psychical interpretations by failing to recognize that a plan is a psychic existence. If they admit mental elements in this sense and also contend for a causally efficacious intelligence, then pragmatism must mean interactionism. It must either reject the controlling power of the "end in view" or it must "interpolate mental links into the causal chain"! Its immediate task must then be to examine more thoroughly the psychophysical problem, and to formulate a philosophy of nature in keeping with the idea of man as a real agent through the imaginative recovery of a physically non-existent past and prevision of the physically non-existent future.

EVE T. KNOWER.

Do We Know Other Minds Medately or Immediately? JOSHUA C. GREGORY. *Mind*, N. S., XXIX, No. 116, pp. 446-457.

In an article which appeared in the *Proceedings of the Aristotelian Society* for 1918-19, on "Our Knowledge of Other Minds," Mrs. Duddington infers from neo-realistic principles that we know one another's minds as directly and immediately as we know physical things. On the contrary, the usual psychological doctrine is that our knowledge of other minds is gained through the medium of the material world. The communication between minds is effected by bodily movements, such as gestures, language—spoken and written, facial expressions, etc. We also infer the contents of other minds from the outward bodily expressions which we ourselves manifest on occasion of certain emotions. That we are dependent upon physical media is evidenced by the fact that human beings often fail to understand each other. Moreover, Mrs. Duddington, besides misrepresenting the nature of inference, ignores some potent facts of experience in arguing that children explicitly infer the presence of other minds before they drop into the unconscious, habitual, inferential method characteristic of adults. Implicit, unconscious inference genetically precedes explicit, conscious inference. Mrs. Duddington is correct in affirming that the *idea* of the *other* self comes first; but she is not correct in supposing that the priority of this explicit affirmation intimates a priority of implicit apprehension. Furthermore, it is gratuitous for Mrs. Duddington to suppose that because the child knows the difference between the living and the inanimate, it can apprehend directly both the physical and mental aspects of a complex reality. The totality of our experience coöperates in and facilitates the apprehension of other minds. While recognizing the difficulty of knowing the contents of the mind that 'withdraws into itself,' Mrs. Duddington gives no adequate

reason for such difficulty, since on her theory the mind is originally endowed with the capacity to directly apprehend other minds. But the mind has no apparent organs of its own for immediately knowing other minds. Its media of communication are physical. "Criticism cannot discover an incompetency in consciousness to realize from the association between its own processes and its own bodily actions that behind other bodily actions there are consciousnesses like unto itself."

J. H. GRIFFITHS.

Theology and Romanticism. HERBERT L. STEWART. *The Harvard Theological Review*, XIII, 4, pp. 362-388.

At the beginning of the nineteenth century the Romantic movement represented three distinct, new ideas: first, the prevalent distrust of human reason, typified by Wordsworth, Coleridge, and Byron in England; second, the awakening of historical interest, as shown in the works of Byron and Scott in England, and De Vigny and Hugo in France; third, the assertion of the trustworthiness of feeling, of instinct, and of the impulses of the heart as against dialectic, or intellectual 'proof' and 'disproof.' In France return to authority meant return to Rome. Such men as De Maistre and Vicomte de Bonald did much to imbue the people with the idea that ignorance is the mother of faith. Although less general, the reaction in England and Germany is quite as startling in a few instances—such as Newman, W. G. Ward, Schlegel, and Tieck. The Reformation was denounced indirectly in politics by such men as Cobbett, Disraeli, and Carlyle, who in decrying the evils of the present harkened back to 'ye good old days' of the supposed blessing of monastic rule. Very different is the Romanticism which glorifies impulse as against reason, the individual as opposed to authority, and self-expression as against self-restraint. Germany boasted of this *Freigeisterei* in the highest degree. Goethe, Schiller, Jean Paul, and Wieland embodied the doctrine of exalting nature above convention. Perhaps the most characteristic aspect of Romanticism is the return to nature, as exemplified by Rousseau, for whom convention becomes an object of contempt, and by Wordsworth, who finds nature the one instructress in virtue. The common element of all the Romanticists, the distrust of reason, has left its traces for both good and evil on every branch of Christendom. While its tendency to rest the Church's authority upon the failure of unassisted intelligence, to imply ignorance as the mother of devotion, is absurd, yet it also advanced both Catholicism and Protestantism, in this century, beyond the hardness of the old intellectualistic apologetic to the realization that the basis of religion is no mere assent to the formula of a creed, and that value judgments of the heart, rather than the cogency of the syllogism, are the sources of faith.

MARGARET R. NYSEWANDER.

The Philosophical Aspect of the Theory of Relativity. A Symposium by A. S. EDDINGTON, W. D. ROSS, C. D. BROAD, and F. A. LINDEMANN. *Mind*, N. S., No. 116, pp. 415-444.

[EDDINGTON:] The theory of relativity of space and time is essentially a physical theory. Its philosophical import is that it recognizes the current physics as simply a knowledge of the relations of Nature to particularly circumstanced observers, and not knowledge of things objective and independent of us. If physics is to deal with the absolute world it must attain to the conception of the absolute world as a four-dimensional order compounded of space and time; and this carries with it the conclusion that the exact laws of gravitation, mechanics and electromagnetism are not the genuine laws governing the external world, but laws automatically imposed by the mind; and "our claim to have grasped the type of law, or even the meaning of law, prevailing in the world outside us, is reduced to very modest proportions." [ROSS:] There are difficulties in the arguments of the supporters of relativity. A real disbeliever in absolute motion and in the ether does not need either the Lorentz or the Einstein theory to dispose of the difficulties of the Michelson-Morley experiments. It is only by assuming absolute motion that the relativity theory is required, and in that case the conclusions of relativists contradict their original assumptions. In particular the Einstein argument for the relativity of simultaneity has as its basis an unacknowledged belief in absolute space, time and motion. On the other hand, some explanation like that of Lorentz, while surprising, is not beyond belief, and will do all the work that Einstein's 'special theory' will do. [BROAD:] The difficulties found by Mr. Ross rest mainly on misunderstandings. The alternatives to the relativity explanation of the Michelson-Morley experiments involve *a priori* objections and great physical difficulties. Relativists do not use the absolute theory as a premise to prove the theory of relativity; the evidence for the equations is solely that they account for the facts, and if there be absolute motion it must have such physical effects as will lead to these relations. At the same time the general theory has an even stronger position than the special theory, in that it unifies Newton's laws of motion and the law of gravitation, making possible a single statement of the laws of nature entirely in terms of relative motions and positions. Prof. Eddington seems to stress too much the function of mind and so makes his theory needlessly subjective. [LINDEMANN:] The theory of relativity is a more convenient and simpler, though not intrinsically truer, method of describing phenomena than the absolutist. It assumes that events take place in a four-dimensional space-time manifold, that there is no unique way of separating the space and time coördinates, but that observers moving relatively to one another will separate them in different ways. By giving up the assumption that

space is everywhere Euclidean, and assuming that the curvature of space is proportional to the mass and inversely proportional to the distance, we secure the same result with but three assumptions, whereas the absolutist system introduces a mysterious entity called force and requires five assumptions at least. The acceptance of the relativity theory is dependent upon one's mental elasticity and one's ability to discard traditional 'self-evident' assumptions.

GLENN R. MORROW.